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ORIGINAL ARTICLE

Overview of Liquid Waste Management in Semarang City Hospital

Billy Zia Napoleon Bayusunuputro[1]*, Juni Arum Sari[1]

[1]Dental Hospital of Universitas Muhammadiyah Semarang, Indonesia.
*Corresponding author: billyzianapoleonb.p@gmail.com

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ABSTRACT
According to the Regulation of the Minister of Health No. 4 of 2018, a hospital is a health service institution that provides complete individual health services that provide inpatient, outpatient and emergency services. A hospital is a labor-intensive organization. Hospitals are supported by units such as Administration, Medical Records, Emergency Units, Radiology, Pharmacy, Laboratories, Nutrition, Laundry, CSSD, and Waste Treatment. Waste management includes liquid waste and solid waste. Good waste management is not only for solid medical waste and sharp objects, but also for liquid waste as a whole. This type of research is a descriptive research. This study aims to obtain an overview of the liquid waste management process in hospitals in the city of Semarang. The Method used is by observation. The research was conducted in March – May 2022. The object of this research is the process of managing liquid waste in a hospital in Semarang City. The Liquid Waste Management Process at Hospitals in Semarang City is in accordance with the Regulation of the Minister of Health of the Republic of Indonesia Number 7 of 2019 concerning Hospital Environmental Health that hospitals have treated liquid waste using WWTP (Wastewater Treatment Plant). The results of the examination of the quality of liquid waste in hospitals in the city of Semarang have met environmental quality standards.

I. INTRODUCTION

According to the Regulation of the Minister of Health No. 4 of 2018, a hospital is a health service institution that provides complete individual health services that provide outpatient, inpatient, and emergency services. The hospital is a labor-intensive organization. Hospitals are supported by units such as Administration, Medical Records, Emergency Units, Radiology, Pharmacy, Laboratories, Nutrition, Laundry, CSSD, and Waste Treatment. Hospitals are not only a place for health services in curing patients, but also as transmission of disease transmission between patients, visitors, officers, and the community around the hospital in accordance with the principle of the epidemiological triangle covering host, agent, and environment (1-7)

The greater the number of health service facilities, the greater the potential for transmission of disease spread and the greater the potential for environmental pollution that occurs because liquid waste disposal activities will also have an impact on disease transmission through water so that it has the potential to also contribute to the decline in public health(8). Hospital waste is all waste generated from the process of hospital activities. Liquid waste is all waste water from the process of activities in hospitals such as waste water from closets, laundry activities, poly services, radiology, and other services that allow the results of the liquid waste to contain microorganisms, pathogens, toxic chemicals, and other hazardous substances. When discharged directly into the environment (9). Therefore, the potential impact of hospital wastewater on public health plays a major role so that each hospital is required to treat its wastewater until it meets the applicable standard requirements for disposal into the surrounding river (10).

Good waste management is not only for solid medical waste and sharp objects, but also for liquid waste as a whole. The state of Indonesia states that there are 648 hospitals out of 1,476 existing hospitals, only 49% of which have incinerators. The

coverage of medical waste management in hospitals in Indonesia, which have carried out medical waste management according to standards is 10.29%. Based on data from the 2015 Indonesian Health Profile, there are 11 provinces, namely Papua, West Papua, West Sulawesi, Central Sulawesi, Southeast Sulawesi, North Sulawesi, North Kalimantan, West Kalimantan, NTT, NTB and Bengkulu, all of which hospitals have not managed. Medical waste according to standards (10–12).

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2. MATERIALS AND METHODS

This type of research is descriptive research which has the main objective to provide an overview or description of the state of an objective perspective to solve problems and answer current and future problems (13). This study aims to obtain an overview of liquid waste management in hospitals in the city of Semarang which was carried out in March – May 2022. The object of this research focuses on the installation of liquid waste treatment in hospitals in the city of Semarang.

3. RESULTS

Sources of Liquid Waste and Hospital Liquid Waste Treatment Process in Semarang City

Based on the permit held by the Hospital in the City of Semarang, the source of the wastewater generated is: This study aims to obtain an overview of liquid waste management in hospitals in the city of Semarang which was carried out in March – May 2022. The object of this research focuses on the installation of liquid waste treatment in hospitals in the city of Semarang. includes waste originating from toilets, sinks, kitchens or nutrition, laboratories, operating rooms, treatment rooms, and other supporting rooms in hospitals in the city of Semarang.

Wastewater from each room is channeled through pipes to the Inlet from Building or called the Dirty Water Control Tub and the Dental Unit Control Tub. From the Wastewater Reservoir or control tub, it flows into the Equal Tub and Initial Sedimentation Tub to separate the fatty oil content from the wastewater. After the Initial Sedimentation Tub, the wastewater is channeled into the Aerobic Tub or Aeration Chamber to increase the concentration of oxygen contained in the wastewater so that the biological oxidation process by microbes can run normally.

Then it goes to the Anaerobic Bath, which is a microbial treatment process without an oxidation process and the last process goes to the Final Sedimentation Bath or Sedimentation Tank to settle the particles (sediment) present in the wastewater with the addition of coagulant. From the settling basin, the WWTP Push Pump flows into the filter basin or filter basin to catch the particles that are still present in the wastewater. The filter tub is filled with gravel and palm fiber media which functions as a filter. After the filtration process, it is flowed to the control tub or WWTP treatment tank in the city of Semarang which functions as a biological indicator pond. The final stage after going through all the wastewater treatment processes, the results will be channeled to the watershed (14).

Description of WWTP

The capacity of the WWTP owned by the Hospital in Semarang City is about 30 m3 / day with a biological treatment system, namely the occurrence of aerobic and anaerobic processes, physical management, namely the filtering process or filtration and chemical processes, namely the occurrence of the chlorination process. The maximum discharge capacity for wastewater treatment at a hospital in Semarang City that is allowed to flow or discharge into the environment is 10 m3/day.

Wastewater Quality Standard

The wastewater quality standard used by hospitals in the city of Semarang is based on the Minister of Environment Regulation No. 68 of 2016 which contains the parameters pH, BOD, COD, TSS, Fatty Oil, Ammonia, and Total Choliform (10).

Results of Liquid Waste Testing for March and April 2022

Hospitals in Semarang City test the quality of wastewater at the point of compliance, which is once a month, which is carried out by an accredited laboratory as an environmental laboratory. The results obtained in March 2022 are as follows:

Tabel 1. Wastewater Quality Standards Minister of Environment Regulation No. 68 years 2016

Parameter	Satuan	Kadar Maksimum
pH	-	6-9
BOD	mg/L	30
COD	mg/L	100
TSS	mg/L	30
Minyak dan lemak	mg/L	5
Amoniak	mg/L	10
Total Choliform	Jumlah/100 ml	3000

Tabel 2. Results of Hospital Wastewater Testing in Semarang City in March 2022

Parameter	Satuan	Kadar Maksimum	Hasil
pH	-	6-9	7,05
BOD	mg/L	30	7,6
COD	mg/L	100	19
TSS	mg/L	30	8
Oils and fats	mg/L	5	≤2,5
Ammonia	mg/L	10	1,01
Total Choliform	Jumlah/100 ml	3000	<3

Based on the results of the liquid waste testing conducted by the Hospital in Semarang City in March 2022, none of the parameters exceeds the quality standard so that the liquid waste disposal carried out by the Hospital in the river area does not pollute the environment.

Tabel 3. Results of Hospital Wastewater Testing in Semarang City in April 2022

No.	Parameter	Satuan	Kadar Maksimum	Hasil
1.	pH	-	6-9	8,08
2.	BOD	mg/L	30	14
3.	COD	mg/L	100	41
4.	TSS	mg/L	30	11
5.	Minyak dan lemak	mg/L	5	≤2,5
6.	Amoniak	mg/L	10	0,586
7.	Total Choliform	Jumlah/100 ml	3000	<3

Based on the results of the liquid waste testing conducted by the Hospital in Semarang City in April 2022, none of the parameters exceeds the quality standard so that the liquid waste disposal carried out by the Hospital in the river area does not pollute the environment.

4. DISCUSSION

The results of the liquid waste produced by the Hospital in the City of Semarang have been treated using IPAL so that all liquid waste that has been treated by the Hospital IPAL is allowed to be discharged into the river. The WWTP used in the hospital is a type of WWTP with processing assisted by aerobic and anaerobic microbes.

The point of compliance for wastewater treatment is carried out every month to find out whether the results of physical, chemical and biological tests have met the quality standards of wastewater, in addition to testing from the WWTP if there are parameters that exceed the threshold or quality standards, it can be used as evaluation material to find out the source of the problem. What happened to the WWTP(15).

5. CONCLUSIONS

Based on research conducted during March and April 2022, the Hospital in has carried out wastewater treatment using WWTP and the liquid waste testing process using the quality standard of the Minister of Environment Regulation No. 68 of 2016 there are no parameters that exceed the threshold so it is safe to be disposed of. To the river

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AUTHORS' CONTRIBUTIONS

BZNB berkontribusi untuk melakukan perancangan dan pengambilan data sedangkan JAS berkontribusi dalam menganalisis dan membuat manuscript

COMPETING INTERESTS

The authors declare that they have no competing interests.

REFERENCES

1. Menkes. Permenkes No. 4 Tahun 2018 tentang Kewajiban Rumah Sakit dan Kewajiban Pasien [Jdih Bpk Ri]. 2018;1–26.
2. Peraturan Menteri Kesehatan. Peraturan Menteri Kesehatan Nomor 30 Tahun 2019 Tentang Klasifikasi Dan Perizinan Rumah Sakit.

Permenkes. 2019;Nomor 65(879):2004–6.
3. Kehutanan Mlh Dan. Peraturan Menteri Lingkungan Hidup Dan Kehutanan Republik Indonesia Nomor 6 Tahun 2021. Menteri Lingkung Hidup Dan Kehutan Republik Indones. 2021;(April):5–24.
4. Kristanti W, Susmeneli H, Purnawati Rahayu E, Sitohang N, Masyarakat K. Pengelolaan Limbah Bahan Berbahaya Dan Beracun (B3) Medis Padat. Higea J Public Heal Res Dev. 2021;5(5):426–40.
5. Menkes. Permenkes No. 7 Tahun 2019 Tentang Kesehatan Lingkungan Rumah Sakit [Jdih Bpk Ri]. 2019;
6. Keputusan Menteri Kesehatan Republik Indonesia. Persyaratan Kesehatan Lingkungan Rumah Sakit. Vol. 2004, Cwl Publishing Enterprises, Inc., Madison. 2004. P. 352.
7. Novitasari L, Yuliawati S, Wuryanto Bagian Epidemiologi Dan Penyakit Tropik Ma, Kesehatan Masyarakat F. Hubungan Faktor Host, Faktor Lingkungan, Dan Status Gizi Dengan Kejadian Demam Berdarah Dengue Di Wilayah Kerja Puskesmas Kayen Kabupaten Pati. J Kesehat Masy. 2018;6(5):277–83.
8. Bina D, Penunjang P, Dan M Ks. Kementerian Kesehatan Ri Direktorat Jenderal Bina Upaya Kesehatan. 2011;
9. Sumalik, Nasrul Hw. Proses Pengelolaan Dan Pengolahan Limbah Cair Rumah Sakit Umum Daerah (Rsud) Kota Batam Management And Processing Processes Regional Waste Of Regional General Hospitals (Rsud) Batam City Pendahuluan Rumah Sakit Merupakan Salah Satu Unit Yang Memproduk. J Dimens. 2018;7(3):497–517.
10. Kementerian Lingkungan Hidup Dan Kehutanan. Peraturan Menteri Lhk No.68 Th 2016 Tentang Baku Mutu Air Limbah Domestik. Kementeri Lingkung Hidup Dan Kehutan. 2016;68:1–13.
11. Sapti M. Profil Kesehatan Indonesia Tahun 2015. Kemamp Koneksi Mat (Tinjauan Terhadap Pendekatan Pembelajaran Savi). 2019;
12. Kemenkes. Profil Kesehatan Indonesia Tahun 2015. Jakarta; 2016.
13. Rohana R, Umar F. Desain Perencanaan Ipal (Instalasi Pengolahan Air Limbah) Menggunakan Proses Biofilter “Up Flow” Rumah Sakit Pendidikan Unismuh. J Linears. 2020;3(1):Progress.
14. Sukadewi Nmte, Astuti Npw, Sumadewi Nlu. Efektivitas Sistem Pengolahan Limbah Cair Di Rumah Sakit Bali Med Denpasar Tahun 2020. Hig J Kesehat Lingkung. 2020;6(2017):113–20.
15. Iravati S, Kimia T, Teknik F, Mada Ug. Evaluasi Pengelolaan Limbah Cair Di Rumah “ X ” Evaluation Of Liquid Waste Management In “ X ” Hospital Kep-. 2017;1(1):40–51.